

7 an insulating layer formed on said conductive
8 circuit layer;

9 an adhesive material layer disposed at
10 specified areas on said insulating film, said conductive
11 circuit layer and said insulating layer; and

12 a mold release material layer disposed on said
13 adhesive material layer.

REMARKS

Applicants have amended claim 3 to reflect the fact that the insulating film has a curved portion and that the first insulating layer is formed on at least the curved portion of the insulating film covered by the printed surface layer.

Applicants have amended claim 4 to show that the cavity is formed in the printed conductive circuit layer, the metallic layer, and the insulating layer formed on the metallic layer and that the reinforcement plate is disposed on a surface of the insulating film opposite to the principal surface containing the cavity.

Applicants have amended claim 16 to reflect the fact that there is a first flexible insulating layer formed on the first metallic layer. With the amendment to claim 16, the amendment to claim 17 becomes consistent and definite since it introduces the second insulating

layer which is formed on the second metallic film on which is formed a third printed conductive circuit layer on which is formed a third metallic layer. Applicants have amended the specification on page 37 to clarify the foundation for claim 17.

In view of the foregoing amendments, it is respectfully submitted that the rejection of claims 3, 4, and 17 under 35 U.S.C. § 112 has been overcome.

Claim 2 has been amended to correct an obvious typographical error. New Claim 30 is a combination of claim 14 and allowed claim 15.

The invention as claimed in the above-identified application is drawn to solving problems with prior art flexible wiring boards. In particular, the present invention is drawn to a flexible wiring board having low resistance in the wiring circuit, good solderability, and excellent durability against bending strains and the like.

According to the present invention, the flexible wiring board consists of a printed conductive circuit layer formed at specified places on an insulating film, a metallic layer formed on the printed conductive circuit layer, the metallic layer having lands, and an insulating layer formed on the metallic layer, the insulating layer having openings which expose the lands.

Independent claims 1, 2, 3, 4, 6, 7, and 16 remaining in the application are drawn to a flexible

wiring board having basic features neither taught nor suggested in the prior art, namely;

"...an insulating film having at least one principal surface;

a printed conductive circuit layer formed at specified areas on said at least one principal surface of said insulating film,

a metallic layer formed on said printed conductive circuit layer...

an insulating layer formed on said metallic layer...."

This in essence is entire claim 1. Claim 2 adds the feature neither taught nor suggested in the prior art, namely;

"...a copper laminated polyimide board disposed in connection with said lands for soldering."

The Examiner has rejected claims 1 and 2 under 35 U.S.C. § 103 as being unpatentable over Bengston et al., U.S. Patent 5,235,139 in view of Fetty, U.S. Patent 5,132,772. It is respectfully submitted that neither Bengston et al. nor Fetty disclose or suggest a flexible wiring board of the type set out in the claims. Contrary to the Examiner's allegation, Bengston only discloses copper layers that are eventually selectively etched away to provide an opening to a dielectric substrate material. Fetty teaches the use of TAB leads to facilitate lead bonding to a semi-conductor device. Neither references teaches or suggests a flexible wiring board as claimed by Applicants. There is no suggestion that the flexible

wiring board of Applicants which features an insulating film containing a conductive circuit layer formed on specified areas of at least one principal surface of the film, metallic layer formed on a printed conductive circuit layer, the metallic layer having lands, an insulating layer formed on a metallic layer, the insulating layer having openings exposing the lands, and other items disposed in connection with the lands. At best, the devices of Bengston et al. and Fetty are rigid and incapable of forming a flexible wiring board. Neither Bengston et al. nor Fetty teach or suggest the use of "a printed conductive circuit layer formed at specified areas on at least one principal surface of an insulating film." Therefore, it is respectfully submitted that the rejection of claims 1 and 2 under 35 U.S.C. § 103 over Bengston et al. in view of Fetty is not well taken and should be withdrawn.

The Examiner has rejected claims 4 and 5 under 35 U.S.C. § 103 as being unpatentable over Bengston et al. in view of Matsumoto, U.S. Patent 4,550,357. While Matsumoto discloses a method of connecting circuit patterns of a flexible printed circuit board to corresponding patterns on a hard circuit board, Matsumoto neither teaches nor suggests a flexible wiring board as defined in Applicant's claims 4 and 5. In particular, claim 4 has a feature that is neither taught nor suggested by Matsumoto or Bengston et. al., namely;

"...a reinforcement plate disposed on a portion of a surface of said insulating film."

Claim 5 further defines the reinforcement plate as "formed of a solderable material." Neither of these features is taught nor suggested by Bengston et al. or Matsumoto alone or in combination. For the reasons stated above, Bengston et al. fails to teach or suggest the basic flexible wiring board and the deficiencies of Bengston et al. are not overcome by any teaching in Matsumoto. Here again, neither Bengston et al. nor Matsumoto disclose "a printed conductive circuit layer formed on specified areas on at least one principal surface of said insulating film." The Examiner equates item 13 of Matsumoto to that of a reinforcement plate. However, Matsumoto's electroconductive adhesive 13 is used to connect a flexible printed circuit board 10 to a hard circuit board 14 and is not a reinforcement plate and is not described as one by Matsumoto. Therefore, it is respectfully submitted that the rejection of claims 4 and 5 under 35 U.S.C. § 103 over Bengston et al. in view of Matsumoto is not well taken and should be withdrawn.

Claim 14 and new claim 30, which is a combination of claims 14 and 15, have features neither taught nor suggested in the prior art, namely;

"...an insulating film having at least one principal surface;

a conductive circuit layer formed at specified areas on said at least one principal surface;

an insulating layer formed on said conductive layer; and

an adhesive material layer disposed at specified areas on said insulating

film, said conductive circuit layer
and said insulating layer...."

The Examiner has rejected claims 6, 7, 9, 14, and 16 under 35 U.S.C. § 103 as unpatentable over Bengston et al. For the reasons stated above, it is respectfully submitted that Bengston et al. fails to teach or suggest a flexible wiring board. Bengston does not show the features common to claims 6, 7, 9, 14, and 16 which is either "a first or a second printed conductive circuit layer formed on an insulating layer" with a metallic layer formed at specified areas on a printed conductive layer and an insulating layer formed on at least the metallic layer. With Bengston et al. failing to teach the basic structure, the reference cannot be equated to a multiple layer of flexible wiring board such as taught and claimed by Applicants. Therefore, it is respectfully submitted that the rejection of claims 6, 7, 9, 14, and 16 under 35 U.S.C. § 103 over Bengston et al. is not well taken and should be withdrawn.

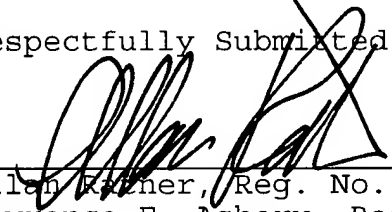
The Examiner has rejected claim 8 under 35 U.S.C. over Bengston et al. in view of Kawakami et al., U.S. Patent 5,294,755. Here again, it is respectfully submitted that Bengston et al. fails to disclose "the printed conductive circuit layer formed at specified places on at least one principal surface of an insulating film." The failure of the basic teaching of Bengston et al. is not completed by Kawakami et al. which teaches a multi-layered structure but not the basic structure of the present invention. Here again, the basic feature of the invention, namely, the "printed conductive circuit

layer" is neither taught nor suggested by Bengston et al. or Kawakami, each taken alone or in combination. Therefore, it is respectfully submitted that the rejection of claim 8 under 35 U.S.C. § 103 over Bengston et al. in view of Kawakami et al. is not well taken and should be withdrawn.

The Applicants have reviewed the other references made of record by the Examiner and are of the opinion that these do not negate patentability of the claims.

In view of the foregoing amendments and arguments, it is respectfully submitted that the claims remaining in the case are allowable and a notice to that effect is earnestly solicited.

Respectfully Submitted,


Allan R. Kerner, Reg. No. 19, 717
Lawrence E. Ashery, Reg. No. 34,515
Attorneys for Applicants

JCS/jjk

Dated: March 30, 1995

500 N. Gulph Road
P.O. Box 980
Valley Forge, PA 19482
(215) 265-6666

31 May '95
